

## REMARKS

This Amendment and Response is filed in reply to the Office action dated August 11, 2006. Claims 1-8, 13-15, 19-26 and 31 are amended. Claims 3, 6, 8, 14-15, 21 and 24 are amended to fix typographical errors. Accordingly, after entry of this Amendment and Response, claims 1-31 remain pending.

### I. Claim Objections

Claims 1, 4, 5, 13, 19, 20, 23, 25, 26 and 31 are objected to for informalities. Specifically, claims 4, 13, 25 and 26 recite “in order to” and “for a data” / “for replicating” / “for storage” and “for transport” which raise the possibility of an optional choice for implementation. Claims 1 and 19 recite an “If” statement making the remaining limitations after the if statement optional. Claims 1, 5, 19, 20, 23, 25 and 31 recite “cannot be” and “can be” which suggest optional limitations. Claim 13 is further objected to for having a missing semicolon to separate the preamble from the body of the claim. In response, claims 1, 4, 5, 13, 19, 20, 23, 25, 26 and 31 have been amended to recite more firm and definite language to eliminate optional limitations. Claims 2, 7 and 22 have also been amended to eliminate similar optional limitations. Further, claim 13 has been amended to correct the missing semicolon.

All claim objections are addressed and the claims are now in proper form.

### II. Claim Rejections Under 35 U.S.C. § 102

Claims 1-2, 4-8, 11, 13, 15, 18-20, 22-26, 29 and 31 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,870,537 to Kern et al. (hereinafter “Kern”). The anticipation rejection is respectfully traversed.

To anticipate a claim, each and every element as set forth in the claim must be taught, either expressly or inherently, in a single reference. See MPEP § 2131. The rejection of independent claims 1, 13, 19 and 31 is addressed first.

#### **A. Rejection of Claims 1, 19 and 31 Under 35 U.S.C. § 102(b)**

Independent claims 1 and 31, as amended herein, each include the limitation “instructing a first data replication facility of a first electronic device in said storage network to log one or more writes to a local storage device when said first replica held by said physically remote storage device is unavailable due to a detected error condition in the storage network.” Claim 19 includes a similar limitation. The Office action asserts that Figure 7, operations 715, 720 and 725 of Kern teach this limitation. The applicant respectfully disagrees. In Kern, the host error recovery program (ERP) determines if an error condition is permanent and if not, retries the I/O operation. If the error condition is permanent, the error is stored in a maintenance log (see *Kern*, column 14, lines 6-12). Thus,

Kern does not instruct a first data replication facility of a first electronic device to log one or more writes to a local storage device when said first replica held by said physically remote storage device is unavailable due to a detected error condition as required by independent claims 1, 19 and 31. For at least this reason, Kern cannot anticipate claims 1, 19 and 31.

Furthermore, in Kern when an error is detected, the secondary storage device is swapped with the primary storage device by terminating the remote copy duplex pair and the application programs running on the primary host process have a device address of the secondary storage device substituted as a device address of the primary storage device (see *Kern*, column 5, lines 10-19). That is, in Kern, the primary storage device is swapped out and writes are directed to the remote storage device rather than instructing the storage system to log writes to a local storage device when the remote storage device holding the first replica is not available as required by independent claims 1, 19 and 31. Thus, for at least this additional reason, Kern cannot anticipate claims 1, 19 and 31.

Finally, independent claim 1, as amended herein, includes the limitations “upon determination that said detected error condition no longer exists, instructing said first data replication facility of said first electronic device to replicate data corresponding to the one or more writes identified in said log to generate a second replica” and “outputting said second replica in accordance with a communication protocol from said first electronic device to a second replication facility of a second electronic device of said physically remote storage device in said storage network to update said first replica.” Independent claims 19 and 31 include similar limitations. The Office action asserts that Kern teaches these limitations through a remote copy duplex pair that is checked to verify that the secondary data storage device is a fully synchronized copy of the primary data storage device before the primary and secondary storage devices are swapped. The Applicant respectfully disagrees. In Kern, when a failure occurs, the primary and secondary devices are checked to verify that they are fully synchronized. Then, the secondary storage device is swapped with the primary device and further writes are directed to the secondary storage device (see *Kern*, Abstract). There is no indication in Kern that when the network connection is reestablished, a second replica is generated using the write log and then output to the remote storage device to update the first replica as required by independent claims 1, 19 and 31. Thus, for this second additional reason, Kern cannot anticipate claims 1, 19 and 31.

***B. Rejection of Claim 13 Under 35 U.S.C. § 102(b)***

Independent claim 13, as amended herein, includes the limitations “instructing each said data replication facility of each of said plurality of programmable electronic devices to enter a logging routine when said host device of said data replication facility detects said communication link failure, wherein said logging routine halts said replicating of data by said replication facility of said host device and said replication facility of said host device identifies

in a log each local write of said host device that detects said communication link failure” and “instructing each said data replication facility of each of said plurality of programmable electronic devices that initiated said logging routine to generate a replica for each said local write identified in said log upon reestablishment of said communication link.” Kern does not teach either limitation.

As discussed above with regards to claims 1, 19 and 31, in Kern, the host ERP determines if the error condition is permanent and if not, retries the I/O operation. If the error condition is permanent, the error is stored in a maintenance log (see *Kern*, column 14, lines 6-12). Thus, Kern does not teach “instructing each said data replication facility of each of said plurality of programmable electronic devices to enter a logging routine when said host device of said data replication facility detects said communication link failure, wherein said logging routine halts said replicating of data by said replication facility of said host device and said replication facility of said host device identifies in a log each local write of said host device that detects said communication link failure” as required by independent claim 13. Thus, for at least this reason, Kern cannot anticipate claim 13.

Further, also as discussed above, Kern does not generate a replica for each said local write identified in said log upon reestablishment of said communication link as required by independent claim 13. Kern retries the I/O operation rather than logging the I/O operation if the error is not permanent. For a permanent error, the host ERP stops applications from issuing I/O operations and record updates to the storage system effected by the permanent error (see *Kern*, column 14, lines 6-24). Thus, for at least this additional reason, Kern cannot anticipate claim 13.

### **C. Conclusion**

Insofar as Kern does not teach all the limitations of independent claims 1, 13, 19 and 31 it cannot anticipate them. Accordingly, at least for the reasons set forth above, claims 1, 13, 19 and 31 are patentable over Kern, believed in form for allowance, and such indication is respectfully requested.

The remaining rejected claims 2, 4-8, 11, 15, 18, 20, 22-26 and 29 all depend, either directly or indirectly, from one of independent claims 1, 13 and 19. Accordingly, these dependent claims are themselves patentable over Kern for at least the reasons set forth above and such indication is respectfully requested. This statement is made without reference to or waiving the independent bases of patentability within each dependent claim.

### **III. Allowable Subject Matter**

The Examiner is thanked for the indication that claims 3, 9-10, 12, 14, 16-17, 21, 27-28 and 30 would be allowable if written in independent form, including all the limitations of the base claims and any intervening claims. These claims have not been amended herein to

be written in independent form. For the above discussed reasons with regard to independent claims 1, 13 and 19, from which claims 3, 9-10, 12, 14, 16-17, 21, 27-28 and 30 depend, it is believed that all claims are in form for allowance without amendment and such indication is respectfully requested. Applicant reserves the right to amend claims 3, 9-10, 12, 14, 16-17, 21, 27-28 and 30 in independent form at a later date.

IV. Conclusion

The Applicant thanks the Examiner for his thorough review of the application. The Applicant respectfully submits the present application, as amended, is in condition for allowance and respectfully requests the issuance of a Notice of Allowability as soon as practicable.

This Amendment is submitted contemporaneously with a petition for a two-month extension of time in accordance with 37 C.F.R. § 1.136(a). Accordingly, please charge Deposit Account No. 04-1415 in the amount of \$450.00, for a two-month extension of time fee. The Applicant believes no further fees or petitions are required. However, if any such petitions or fees are necessary, please consider this a request therefor and authorization to charge Deposit Account No. 04-1415 accordingly.

If the Examiner should require any additional information or amendment, please contact the undersigned attorney.

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Respectfully submitted,

  
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